INDICATIONS FOR PHOTOCOAGULATION TREATMENT OF DIABETIC RETINOPATHY: DIABETIC RETINOPATHY STUDY REPORT NO. 14

*The Diabetic Retinopathy Study Research Group**

Three factors need to be considered when deciding whether to recommend photocoagulation treatment of diabetic retinopathy: the risk of visual loss without treatment, the chance of benefit from treatment, and the risk of adverse treatment effects. Both physician and patient should be familiar with these factors and should understand that the principal goal of treatment is to *prevent visual loss,* not to improve vision. In this article, all three factors are reviewed using data from the Diabetic Retinopathy Study (DRS). Also considered are the clinical application of the study's findings and clinical impressions concerning other factors that may influence the decision to initiate photocoagulation when its goal is to prevent severe visual loss by causing regression of new vessels or preventing their development. Photocoagulation techniques currently in use for this purpose are considered in another article in this issue (page 254), as is photocoagulation treatment for diabetic macular edema (page 265).

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FACTORS INFLUENCING THE RISK OF VISUAL LOSS

Although considerable progress was made during the 1960s in describing the natural course of diabetic retinopathy, little quantitative information concerning the risk of visual loss at various stages of retinopathy was available prior to the DRS. We will briefly review some of the descriptive information available when the DRS was designed and then summarize information from this study that allows estimates to be made of the risk of visual loss associated with specific retinopathy lesions, combinations of lesions, and systemic factors.

Initial Proliferation and Natural Course of New Vessels

Serial observations of patients with nonproliferative diabetic retinopathy (NPDR) indicated that, in some patients, the initial proliferation of new vessels on the surface of the retina followed closely after the appearance or worsening of certain intraretinal lesions, including: (1) extensive retinal hemorrhages and/or microaneurysms; (2) cotton-wool spots (soft exudates); (3) tortuous small vessels, considered intraretinal new vessels by some observers and dilated preexisting capillaries by others, and termed *intraretinal microvascular abnormalities* (IRMA) in the Airlie House Classification; (4) venous caliber abnormalities, chiefly the segmental dilation termed *beading;* and (5) arteriolar abnormalities, including irregularities in caliber and loss of transparency of the vessel wall [1–4]. These five lesions were believed to indicate progressive retinal ischemia, which in turn was postulated as a possible cause of new vessel formation [5, 6]. These lesions were included in the Airlie House Classification, which was modified for the DRS [7], and the first four were used in the definition of *severe NPDR,* the minimum severity of retinopathy eligible for entry into the DRS [8]. Severe NPDR was defined by the presence of at least three of these four lesions—hemorrhages and/or microaneurysms, soft exudates, intraretinal microvascular abnormalities, and venous caliber abnormalities—each in at least two quadrants. In the case of hemorrhages and/or microaneurysms, severity in at least one quadrant had to equal or exceed that of Standard Photograph 2A (Fig 1).

The natural course of new vessels had also been described: (1) the appearance of new vessels without visible accompanying fibrous tissue on the surface of the retina, often along the retinal veins or at the disc; (2) growth of the new vessels along the surface of the retina, followed by regression, often with the concurrent appearance of fibrous tissue;